

Notes on status, distribution and diet of Northern Quoll *Dasyurus hallucatus* in the Mackay-Bowen area, mideastern Queensland

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ABSTRACT

A survey of the declining Northern Quoll *Dasyurus hallucatus* was conducted in coastal and near-coastal areas between Mackay and Bowen, mideastern Queensland. The survey used incidental records from the public and trapping and sightings from resource management agencies. The species was recorded at a total of 40 separate localities, which were associated mainly with rocky habitats close to permanent water. Preliminary scat analysis indicated that the species is primarily insectivorous, with small mammals consumed only where abundant. Populations of this species on flatland and coastal habitats in the study area appear threatened by continuing broadscale loss of habitat.

Key words: Quoll, Dasyurid, Carnivore diet, Queensland fauna, Community fauna records, Scat survey.

INTRODUCTION

An Australia-wide decline in the distribution and abundance of Northern Quoll *Dasyurus hallucatus* was recently reported (Braithwaite and Griffiths 1994). This decline has been estimated as a range contraction of between 10 and 75% nationally (Kennedy 1992; Braithwaite and Griffiths 1994) and the species is presently considered nationally as "near-threatened" (Maxwell *et al.* 1996). The apparent scarcity of *D. hallucatus* in parts of north Queensland has been variously attributed to pastoralism, prevalence of Cane Toads *Bufo marinus* and introduction of exotic diseases such as toxoplasmosis (Braithwaite and Griffiths 1994; Maxwell *et al.* 1996). As a member of a group of declining, critical weight range carnivorous marsupials (Burbidge and McKenzie 1989), this is clearly cause for concern, although it was also noted that the lack of systematic large-scale fauna surveys in northern Australia make its apparent decline difficult to assess.

This paper presents recent records and observations of *D. hallucatus* in a long-settled area of mideastern Queensland. Information on habitats utilized, diet and distribution is documented, as well as indirect detection methods for future surveys for this species. These records add considerably to the current sparse knowledge of the ecology of *D. hallucatus* in Queensland.

METHODS

The study locality is defined as an area between the town of Koumala and Cape Upstart and follows the mainland coast extending some 80 km inland (Fig. 1). Data

on the distribution of *D. hallucatus* in the Mackay-Bowen area were compiled. Records from all sources were collected from between mid-1994 to 1996 and came from:

- (i) Contact with the general public and community groups through direct enquiries, requests for removal of *D. hallucatus* from households, field notes from observations of local naturalists, fauna care groups and trap records from studies by environmental consultants.
- (ii) Incidental sight and trap records from State Government environmental or resource management agencies.
- (iii) Opportunistic collection of scats.
- (iv) Records of the Queensland Museum.

The location of trapped animals, reliable sightings and scats were determined. The reliability of sightings by the general public was gauged by questioning, e.g., size of animal, colour and pattern over the animal's body, shape, size and colour of tail and general behaviour. Questioning was by telephone or face-to-face interview. Where possible, independent confirmation of sightings was made through examination of photographs, specimens or scats, or collaboration by reliable observers such as local QPWS rangers, DPI or DNR forest officers, or naturalists.

For verified sightings and scat records, altitude, vegetation type and landform details were recorded by site inspection or reference to available mapped information. Locations were plotted on 1:100 000 Natmap series topographic maps. Habitat values were assessed within a 200 m radius of each plotted

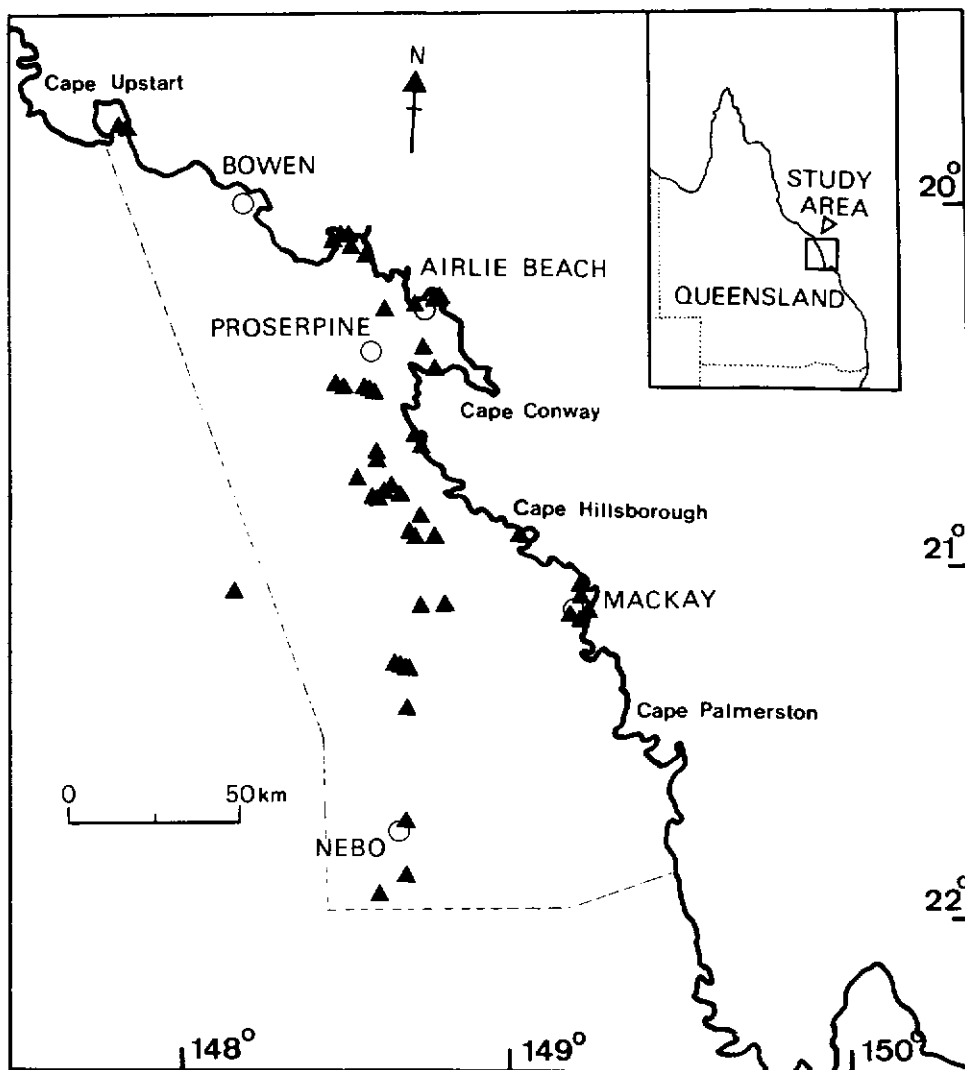


Figure 1. Location of the Mackay-Bowen study area. Broken line border indicates boundary. Distribution of the Northern Quoll *Dasyurus hallucatus* in the Mackay-Bowen district from 50 direct observations and scat records (black triangles). Observations date from 1936–1996.

location. For the purposes of this study, individual localities for a detection (scat location, sighting, report or trap record) were arbitrarily defined as a point more than 300 m away in any direction from another. Proximity of these locations to major landscape features such as rocky areas, distance to creek lines and waterpoints were measured directly from maps, or during site inspection.

In this study, scat collection was largely opportunistic, and scats were collected mainly in areas where anecdotal reports suggested the presence of *D. hallucatus*.

Suspected scats of *D. hallucatus* were initially identified by their small size, shape and texture (Triggs 1996). Scats were sent to Barbara Triggs, an authority on Australian mammalian scat and hair analysis, for identification. Northern Quoll scats may be

confused with those of Spotted-tail Quoll *D. maculatus*, however, the scats of the latter are usually larger (Triggs 1996). *Dasyurus maculatus* are very rare or absent within the study area (Ingram and Raven 1991; Burnett 1993). The two species can be reliably distinguished by the internal structure of the grooming hairs in their scats (B. Triggs, pers. comm.). Most *D. hallucatus* scats examined had at least 1 grooming hair present. *D. hallucatus* scats also resemble those of Cane Toad *Bufo marinus*, Green Tree Frog *Litoria caerulea* and Water Rat *Hydromys chrysogaster*, however, the scats of the latter were moister, smellier and smaller than the dry, friable and comparatively odourless scats of *D. hallucatus*.

The mammalian prey items of confirmed *D. hallucatus* scats were recorded, expressed as frequency of the total number of scats collected.

Table 1. Known localities of *D. hallucatus* across the study area.

Date	No.	Type	Lat.	Long.	Elev.	Locality
06/08/1994	1	RK	20°55'16"	148°43'30"	40	Along Calen-Mount Charlton Road, 200 m W. of Toons Rd
00/00/1936	1	S,K	21°3'23"	149°8'18"	20	About 500 m S. of south end of Orphanage Swamp, Eimeo
00/00/1992	1	S,K	21°37'56"	148°40'52"	220	Nebo M.E.B. substation shed
00/03/1991	1	S,K	21°58'39"	148°35'11"	200	Found dead outside farm house "Valkyrie"
00/05/1995	1	S	20°47'50"	148°32'48"	120	At Forest Rangers Res, Cathu S.F.
05/10/1996	1	S	20°47'53"	148°32'41"	120	Forestry Barracks shed, Cathu S.F.
14/3/1996	1	S	20°49'13"	148°36'27"	120	1 km N of Cathu S.F. Rd and O'Connell R.
02/08/1994	S, 7	I, S	20°48'21"	148°41'55"	60	Commelli Farm, about 7 km E. of Yalbaroo
05/01/1994	S	I	20°49'10"	148°35'46"	120	200 m E. of Boundary Ck along Cathu Rd
31/7/1989	1	S	20°27'38"	148°42'40"	5	Boat ramp W. of Wilson Bch, on Proserpine R.
16/7/1989	1	S, T	20°20'48"	148°45'30"	100	Repulse Creek, Conway N.P.
03/02/1995	1	RK	20°43'47"	148°36'13"	50	2.5 km S. of Bloomsbury, along Bruce Hwy
16/05/1996	1	S, T	21°9'9"	149°10'17"	5	3 Adrian Street, East Mackay
00/04/1990	1	S, T	20°39'30"	148°42'3"	40	Hills W. of Midge Point
00/04/1990	1	S, T	20°39'37"	148°42'10"	20	Hills W. of Midge Point
04/12/1990	1	S, T	21°8'20"	149°10'17"	0	Canelands Shopping Centre, Mackay
22/1/1990	1	S, T	20°54'50"	148°43'9"	60	Barron Pocket, 1.5 km from Mt Charlton Rd
18/11/1995	S, 4	S, T	19°47'2"	147°49'39"	100	2 km ESE of Station Hill, Cape Upstart
22/04/1991	1	S, T	20°29'24"	148°33'22"	20	Proserpine Airport
08/03/1984	1	S	20°17'15"	148°46'10"	20	Swamp Bay Carpark, Conway N.P.
26/03/1991	1	S	20°17'5"	148°45'43"	20	Ranger Barracks, Conway N.P.
00/09/1995	1	S, T	20°29'24"	148°33'22"	20	Proserpine Airport
05/02/1995	1	S, K	21°29'24"	148°33'22"	20	Proserpine Airport
05/02/1995	S	I	21°14'20"	148°27'8"	580	Hazlewood Gorge cliffines
05/03/1995	S	I	21°14'26"	148°27'8"	560	Hazlewood Gorge cliffines
05/04/1995	S	I	21°14'20"	148°27'18"	560	Hazlewood Gorge cliffines
05/05/1995	S	I	21°14'20"	148°27'11"	580	Hazlewood Gorge cliffines
05/06/1995	S	I	21°14'23"	148°26'57"	560	Hazlewood Gorge cliffines
20/12/1993	1	S	20°4'57"	148°26'28"	20	1 km S. of Monties Resort, Cape Gloucester
00/06/1991	1	S	21°6'4"	148°46'31"	60	500 m S. of Dow's Creek Hall
15/01/1996	2	S, K	20°42'40"	148°35'31"	40	Doghertys Rd, near Bloomsbury
00/00/1986	1	S	20°6'4"	148°29'45"	40	1 km SW. of Dingo Beach along Pioneer Dr.
00/00/1991	1	S	20°18'31"	148°38'22"	70	N. of jn of Richardsons Rd and Crofton Ck
00/00/1992	1	S, K	20°45'59"	148°33'32"	60	V. close to Taringa, nr Horse Ck
28/02/1996	2, 1	S, K	21°24'6"	148°32'12"	400	About 2 km N. of Mt Britton Mines
00/00/1986	2	S, K	20°5'41"	148°30'19"	20	58 Pioneer Drive, Dingo Beach
24/10/1996	1	S, T	20°15'35"	148°38'48"	100	S. of Charleys Creek, on road toward Dryander N.P.
08/02/1996	1	S	21°8'42"	148°44'41"	100	Imm. W. of Middleplain Ra., near Gargett
08/01/1996	1	S, K	20°54'0"	148°46'1"	30	About 500 m W. of Calen
00/03/1996	1	S	20°4'2"	148°27'19"	20	About 400 m E. of Monties Resort
29/07/1994	1	S	20°49'21"	148°32'18"	800	Cathu S.F., W. of Mt Macartney
14/05/1994	1	S	20°48'0"	148°32'31"	120	Pandanus Ck, Joxut State Forest Park
16/05/1994	1	S	20°55'26"	149°02'23"	100	Base of cliffs near water supply, Cape Hillsborough N.P.
00/06/1996	1	S, K	20°16'18"	148°42'46"	20	Airlie Beach Motor Lodge
00/11/1990	1	S	21°55'29"	148°42'31"	170	Dipperu N.P. about 1 km N. of Yard Ck dam
00/03/1996	1	S	21°9'28"	149°11'48"	10	Far Beach, Evans Rd, about 100 m W. from Beach
00/00/1982	1	S, T	20°29'35"	148°31'18"	50	Low hill imm. W. of Stony Ck, about 3 km W of Pros. Airport
00/00/1982	1	S, T	20°29'57"	148°31'32"	50	Stony Ck, about 2.5 km W. of Proserpine Airport
15/07/1995	1	S, T	20°29'24"	148°33'22"	20	Proserpine Airport and surrounds
22/07/1994	1	S	21°10'59"	148°06'25"	520	Nebo, 80 km NW. at Hillalong Stn, Limestone Hill

Key: For "No." S = scat record, otherwise number is total animals observed; for "Type" (record type) S = seen, RK = roadkill, K = mortality record, I = Incidental (scat record), T = trap record or hand-caught. Elevation is to nearest 5 or 10 m.

RESULTS

Reporting rates

A total of 50 records of *D. hallucatus* was confirmed from 40 separate localities within the study area (Table 1). Although reports span 60 years (1936–1996), over 80% of observations were from 1990 to 1996. Most records were provided by the Queensland Environment Protection Agency (EPA) or Queensland Parks and Wildlife Service (QPWS) and Department of Primary Industries (DPI) staff, local naturalists and sugar cane farmers. The balance came from householders

and business owners wishing to remove or identify the animals. A single record came from the Queensland Museum. Most observations were incidental sightings of live animals (30 records). Eleven records were of dead animals. *D. hallucatus* were identified solely by scats at four localities and were trapped at three separate locations. There were several reliable sight records that were not used directly, due to inability by the respondent to recall either an accurate locality or date (or both). However, some provided useful supplementary information on distribution and behaviour, and where used, are noted in the relevant text.



Dasyurus hallucatus, Dow's Creek area, mideastern Queensland (about 50 km due west of Mackay). This individual was removed from a rural householder's bathroom. Photo: Steve Pearson.



The same individual in profile. Note that attempts to hand-capture and remove this specimen have resulted in hair loss around its tail, a well-known predator-evasion response in some *Dasyurus* spp. Photo: Steve Pearson.

Two views of Hazlewood Gorge, about 25 km SSW of Eungella township, mideastern Queensland. This locality of *D. hallucatus* exhibits all the typical features of suitable habitat for the species: a rugged landform of cliffs and gorges with steep, rocky scree slopes and presence of free water available throughout the year. Photos: Steve Pearson.



Habitat use

D. hallucatus was observed within a wide range of vegetation types, including low dry vine thickets, margins of notophyll vine-forests and several different kinds of eucalypt-dominated forest and woodlands, including *Corymbia tessellaris*, *Eucalyptus platyphylla*, *E. crebra*, *E. populnea* and *E. acmenoides* dominated associations. Animals were also observed adjacent to *Acacia rhodoxylon*-*E. crebra* forest, within *A. spirorbis*-*Melaleuca viridiflora* woodlands, at the base of cliff lines within *Lophostemon confertus*-*E. acmenoides* forest with a *Xanthorrhoea johnsonii* understorey, riverine woodland dominated by *L. grandiflorus* subsp. *riparius*, areas adjacent to mangroves, within and adjacent to sugarcane farms and in urban areas.

D. hallucatus was recorded across a range of altitudes from between sea-level to 800 m. The median elevation of all records was 60 m. Over 69% of records were from elevations at or below 100 m.

The species was frequently observed in foothill areas close to rocky hills or along boulder-strewn slopes and creek lines. Many areas were also close to permanent water supplied from larger creeks, rivers, swamps or springs. Over 57% of recordings in this study were within 200 m of permanent freshwater. There was no preference for a particular geological substrate within rocky habitats. *D. hallucatus* was reported from areas of acid and intermediate volcanics, quartz diorites, quartzose sandstone and siltstone deposits, as well as granite formations. Acid volcanics, such as andesites and rhyolites, and granite igneous intrusions, were the most commonly utilized substrates, but were also the most common geological types within the study area (Isbell and Murtha 1972). *Dasyurus hallucatus* was not restricted to rocky areas in this study. Several records are from plains of quaternary alluvium, far from rocky hills or geological formations, and close to human settlement.

D. hallucatus were directly observed in small cave overhangs at the base of cliff lines, bulldozer-pushed timber piles, within a stack of household firewood, stacks of sawn undressed timber, underneath house verandahs, within the outer frame of a washing machine and within house ceilings. These areas were thought to be only temporary resting shelters. Locations that could loosely be termed "dens" (areas where *D. hallucatus* habituated on a semi-permanent basis for at least two weeks) and where young were occasionally reared, were within house roofs (two records) and a sugar cane farm shed (single record).

Habitat records from scats

D. hallucatus scats invariably occurred on hard surfaces, such as granite tors, granite slabs, concrete pipes or occasionally on dry, machinery-compacted soils. These scats were found only in areas where there is protection from rain and wind. Sites where two or more *D. hallucatus* scats were collected ranged from under large granite boulders and slabs, tops of cliff lines, on top of large boulders, within old concrete culverts under gravel roads and within a sugar cane farm storage shed. Areas with large numbers (2–50) of fresh and old scats were assumed to be habitats regularly used by these animals. This is supported by Triggs (1996), who noted that scats of the species are seasonally deposited outside the entrances to dens.

Diet

Twenty-six *D. hallucatus* scats, from four discrete localities, were examined. Scats were friable in appearance, usually with abundant insect/invertebrate remains. They were 3–4 cm long and about 1 cm in diameter, and observed in agglomerations of between 2 and 50.

Scats of *D. hallucatus* containing mammalian hair were selected and those with no obvious guard or mammalian hairs were omitted. Despite this bias, local *D. hallucatus* were found to be mainly insectivorous (Table 2). Beetles (Coleoptera) and grasshoppers (Orthoptera) appear important in their diet, with indigestible forewing cases (elytra) and upper hindlegs (femurs) commonly present. Small mammals formed a minor component of the scats. Ground-dwelling mammals, especially Cane Rats *Rattus sordidus*, were an important item of the diet at one locality. Rabbits *Oryctolagus cuniculus* were also recorded from two scats at the same locality. Both species are known to be locally common (J. Evans, BSES pers. comm.; pers. obs.). Arboreal mammals

Table 2. Prey items identified in *D. hallucatus* scats from four separate localities in the study area.

No. of scats	Percentage of total	Prey item
6	23	Cane Rat <i>Rattus sordidus</i>
2	8	Unidentified <i>Rattus</i> sp. (probably <i>R. sordidus</i>)
2	8	Rabbit <i>Oryctolagus cuniculus</i>
1	4	Glider (Petauridae <i>Petauroides</i> / <i>Petaurus</i> spp.)
1	4	Crustacean fragments (probably a <i>Cherax</i> spp.)
14	53	Insect fragments, <i>D. hallucatus</i> grooming hairs
Total 26	100	

were rare in scats. Hair of a species of glider (Petauridae) were recorded from a single scat at one locality. There is also an undated observation of a *D. hallucatus* attacking and eating a Black Rat *Rattus rattus* in a Proserpine house roof space (B. Nolan, QPWS, pers. comm.). The presence of crustacean (Decapoda) fragments in scats from Cape Upstart suggests *D. hallucatus* may also forage along water courses.

D. hallucatus were attracted to human food refuse. Two records from this study are from individuals found trapped in large rubbish bins. One animal from the Cathu State Forest area was observed feeding on a fish-based dried cat-food placed in a domestic cat's food dish (J. Barford, DPI, pers. comm.). There are seven sight records of individual *D. hallucatus* searching for or stealing food from rural residences.

Mortality

Eleven records of *D. hallucatus* mortality reveal that domestic dogs were responsible for 36% of all deaths. Animals were most frequently killed by farm dogs in this study. Predation by domestic or feral cats was also recorded. The only known instance of predation by a native animal was an undated report of a Black-headed Python *Aspidites melanocephalus* taking an individual within the Proserpine Airport roof (B. Nolan, QPWS, pers. comm.). Destruction of *D. hallucatus* by householders because of threat to domestic poultry or nuisance occurred on two separate occasions.

DISCUSSION

Value of incidental records

Collection of fauna records through public survey and incidental reporting is non-systematic and may lead to biased estimates of distribution and abundance. Records, such as those used in this study, are often concentrated in areas of high human population density, or where people congregate, such as roads. The public perception of the species recorded using these methods, particularly if perceived as rare or unusual, may also influence reporting rates. Despite these constraints, incidental records provide useful information to begin planning intensive and systematic survey of cryptic or nocturnal species such as *D. hallucatus*. This study provided significantly more records of this species in mideastern Queensland than previously published elsewhere (Ingram and Raven 1991; Braithwaite and Griffiths 1994).

Distribution of records

Existing records indicate that *D. hallucatus* is infrequently recorded in the Mackay-Bowen

district. Localities where animals were repeatedly observed (i.e., >3 detections) include Cape Upstart, Dingo Beach-Dryander Bays, Cathu State Forest, Hazlewood Gorge, Mount Charlton-Whiptail Range and the Conway Range-Proserpine areas. The presence of the species in urban areas such as Proserpine and Mackay, towns surrounded by extensive areas of cultivation of sugarcane and far (up to 15 km) from natural or disturbed native forest, is difficult to explain. No *D. hallucatus* has been recorded from the large rocky offshore islands east of the Mackay-Bowen area, despite the occurrence of populations in similar habitats on the nearby mainland. Biological surveys of these islands detected few mammals (K. McDonald, QPWS, pers. comm.). There are several large, unsurveyed regions within the study area where this species probably occurs. These include the upper Andromache River, Kangaroo Creek Tablelands, the western edge of Cathu State Forest, along Massey and Urannah Creeks, Dick's Tableland, Mount Curlew, Mount Roundback and Mount Pring. All these areas are undisturbed by intensive agriculture, are remote and rocky, and have permanent water available for *D. hallucatus*.

Habitat utilization

D. hallucatus prefers areas where a combination of landform and geology have created formations of scree, talus and boulder stacks with gaps and crevices suitable for shelter (Begg 1981; Friend *et al.* 1991). Such habitat occurs most frequently within the study area on coastal hills and mountains of low to moderate elevation with steep-sided slopes, cut by steep minor gullies and short streams. This study supports the finding that *D. hallucatus* apparently prefer rocky areas in close association with permanent water, as observed by Braithwaite and Griffiths (1994) and King (1989).

The high proportion of *D. hallucatus* observed at elevations less than 80 m presumably reflects increased density of settlement in the lower-elevated regions within the study area, where encounters with this species are more likely, and consequently reported. The species is infrequently recorded on coastal plains, appearing more often in a landscape of rocky upper slopes and escarpment areas. *D. hallucatus* is present in the study area in a wide range of habitat types, probably occurring most frequently in open forests and woodlands dominated by *Eucalyptus crebra*, *E. platyphylla* and *E. acmenoides*.

Of interest is the use by *D. hallucatus* of stacks of timber, areas underneath wooden rural houses or concrete culverts in contact

with the ground, away from rocky substrates. This suggests that the species may make use of natural dead fallen timber in the study area as dens or temporary refuges, noted by Triggs (1996) for populations in the Northern Territory.

Diet

D. hallucatus recorded in this study appear similar to Western Quoll *Dasyurus geoffroyi* in their primarily insectivorous diet and fondness for food refuse (Soderquist and Serena 1994). Both are generalist predators capable of taking medium-sized and small mammals when available.

Threats

D. hallucatus is locally threatened by predation from domestic dogs and cats. Possible threats include habitat loss by further clearing for agriculture (such as large-scale expansion of sugarcane farming areas), secondary poisoning by baiting for *R. sordidus* (a known prey item) and direct poisoning in baiting for feral dogs and dingos. The species is considered at risk in local 1080 baiting programmes, due to its appetite for food refuse (this study) and meat baits (Calver *et al.* 1989; Friend *et al.* 1989). *D. hallucatus* within the study area is unlikely to tolerate sodium mono-fluoroacetate, as no species of the naturally fluoroacetate-producing plant genera *Gastrolobium* or *Oxylobium* are known to occur within its boundaries (unpublished Queensland Herbarium records). Tolerance of *D. hallucatus* to brodifacoum, a widely used rodenticide in the study area, is unknown (A. Brodie, BSES, pers. comm.). Brodifacoum is used to control populations of *R. sordidus*, a significant pest of sugar cane in some parts of the Mackay-Bowen district. The generalist nature of the diet of *D. hallucatus* suggests that individuals may take poisoned dead or dying *R. sordidus*.

Cane Toads *Bufo marinus* are often listed as a potential threat to Quolls in subtropical Australia (Burnett 1993; Maxwell *et al.* 1996). However, *D. hallucatus* persists in parts of the study area where *B. marinus* is known to be prevalent, such as in and around Mackay, Airlie Beach and Cathu State Forest (pers. obs.). Difficulty in separating scats between these in some locations in this study suggests co-occurrence.

Status and further study

Despite the limitations of this survey, it appears that *D. hallucatus* is still extant and under threat in the Mackay-Bowen study area. The few studies in Queensland of this species

suggest it has declined historically, particularly in south-east Queensland (Watt 1993) as well as in parts of Cape York Peninsula and around Townsville (Maxwell *et al.* 1996), confirming part of the premise of Braithwaite and Griffiths (1994) and justifying its "near-threatened" status at a national level (Maxwell *et al.* 1996). Results from this study cannot be used to infer local decline or population increase, due to biases in the data collected, although serious historic decline seems unlikely.

Known habitat of *D. hallucatus* is conserved in parts of the study area. Several repeated recordings suggest small to moderate-sized populations remain in some areas. Observations are known from six local national parks. Most of these are large (>800 ha), elevated and relatively isolated parks, with extensive rock outcrops, steep rocky slopes and areas of boulder columns and piles. One (Dipperu NP) lacks rock outcrops, but has areas of dead fallen timber. These sites all contain permanent waterholes and creeklines and are infrequently disturbed by stock. The species is also known from two local state forests.

Animals occurring above 80 m elevation within massifs or ranges of significant rock outcrops are considered to be secure within the study area, but may be put at risk through events that remove or alter permanent sources of fresh water, such as unseasonal drought, water harvesting or small-scale development. The majority of observations within conservation reserves are included in this category. However, coastal lowland (<80 m elevation) populations, occurring among rock outcrops and populations on flat or undulating lands at any elevation, must be considered vulnerable to the threats outlined above. This particularly applies if the latter are shorter-lived lowland savannah populations of *D. hallucatus* described by Braithwaite and Griffiths (1994). Lowland and flat land habitats suitable for *D. hallucatus* in the Mackay-Bowen study area are few, and are subject to on-going clearing.

Future systematic survey in the study area for *D. hallucatus* should involve the use of scat collection and identification across a range of landform and vegetation types. Scat collection in remote areas in suitable habitat is suggested as a simple detection technique. Future studies in Queensland on this species should also examine its local susceptibility to 1080 and brodifacoum poisons. Until these are investigated, land managers involved in broadscale baiting for feral dogs, dingoes and cane rats should consider methods that minimize the risk of potential poisoning of *D. hallucatus*.

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